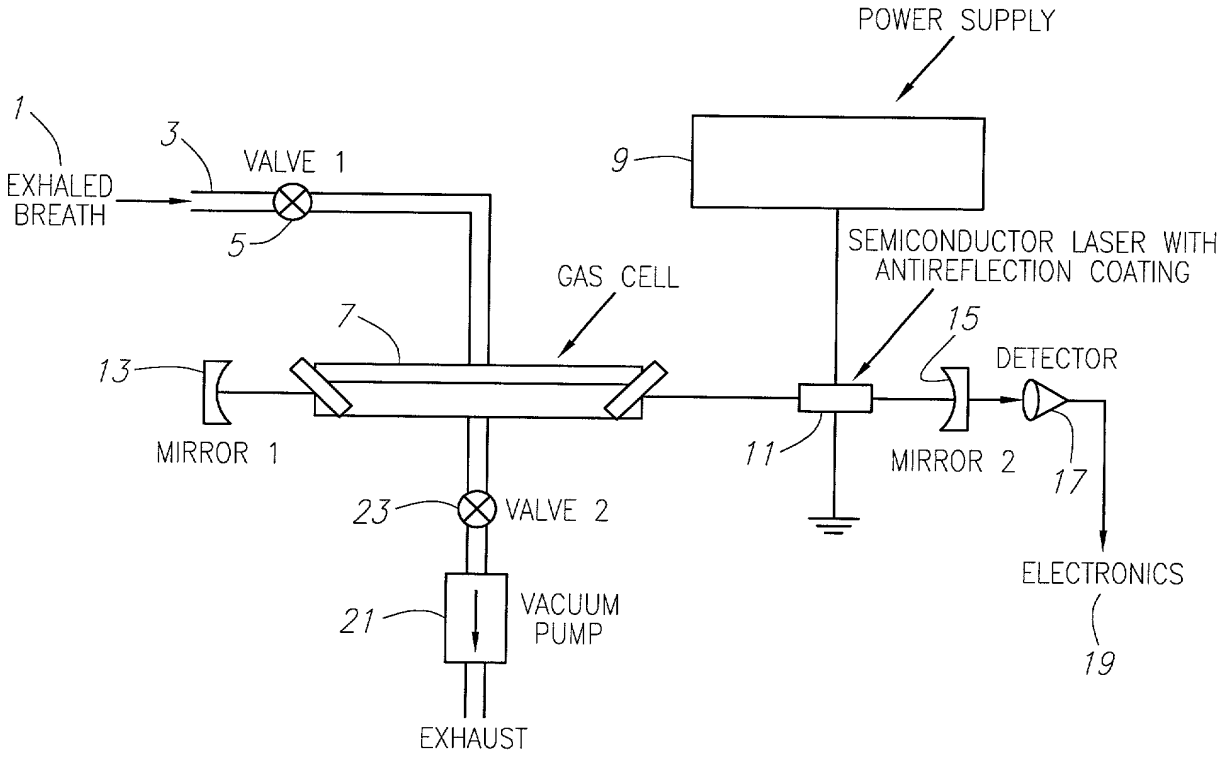
POWER SUPPLY
1
EXHALED BREATH
3
VALVE 1
5
9
SEMICONDUCTOR LASER WITH ANTIREFLECTION COATING
GAS CELL
7
15
13
DETECTOR
MIRROR 1
11
MIRROR 2
17
23
VALVE 2
ELECTRONICS
21
VACUUM PUMP
19
EXHAUST

FIG. 1

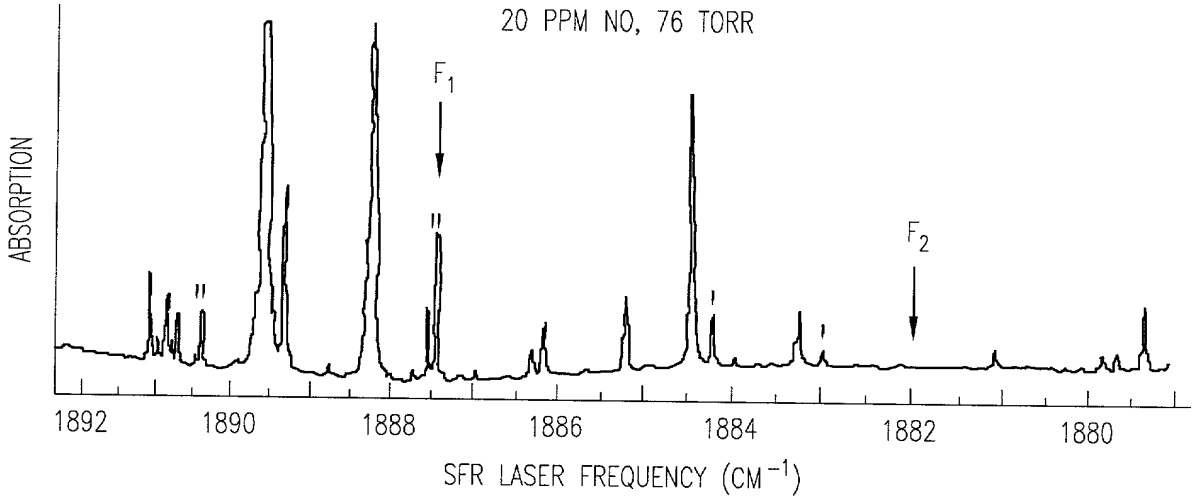
20 PPM NO, 76 TORR
F_1
F_2
ABSORPTION
1892
1890
1888
1886
1884
1882
1880
SFR LASER FREQUENCY (CM^{-1})

FIG. 2

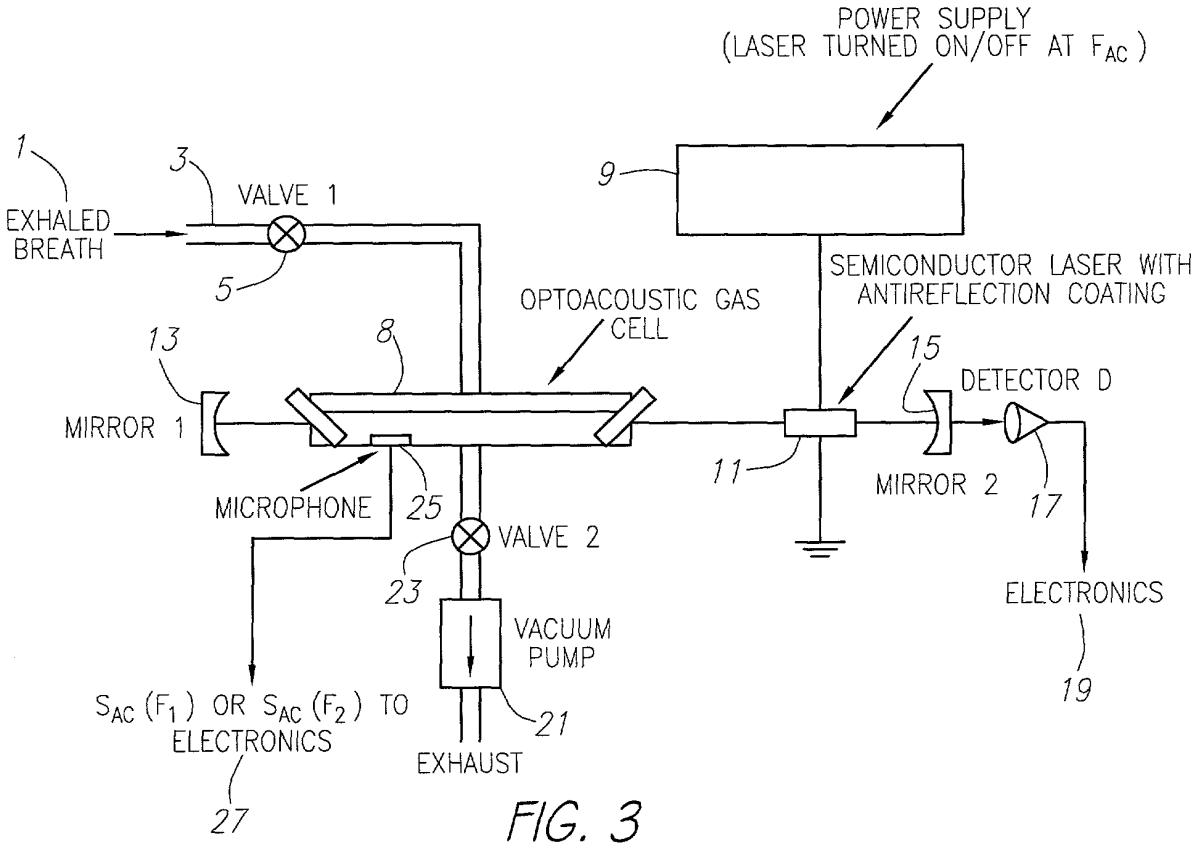
POWER SUPPLY
(LASER TURNED ON/OFF AT F_{AC})
1
EXHALED BREATH
3
VALVE 1
5
9
SEMICONDUCTOR LASER WITH ANTIREFLECTION COATING
OPTOACOUSTIC GAS CELL
13
MIRROR 1
8
15
DETECTOR D
11
MIRROR 2
17
MICROPHONE
25
VALVE 2
23
VACUUM PUMP
21
ELECTRONICS
19
$S_{AC}(F_1)$ OR $S_{AC}(F_2)$ TO ELECTRONICS
27
EXHAUST

FIG. 3

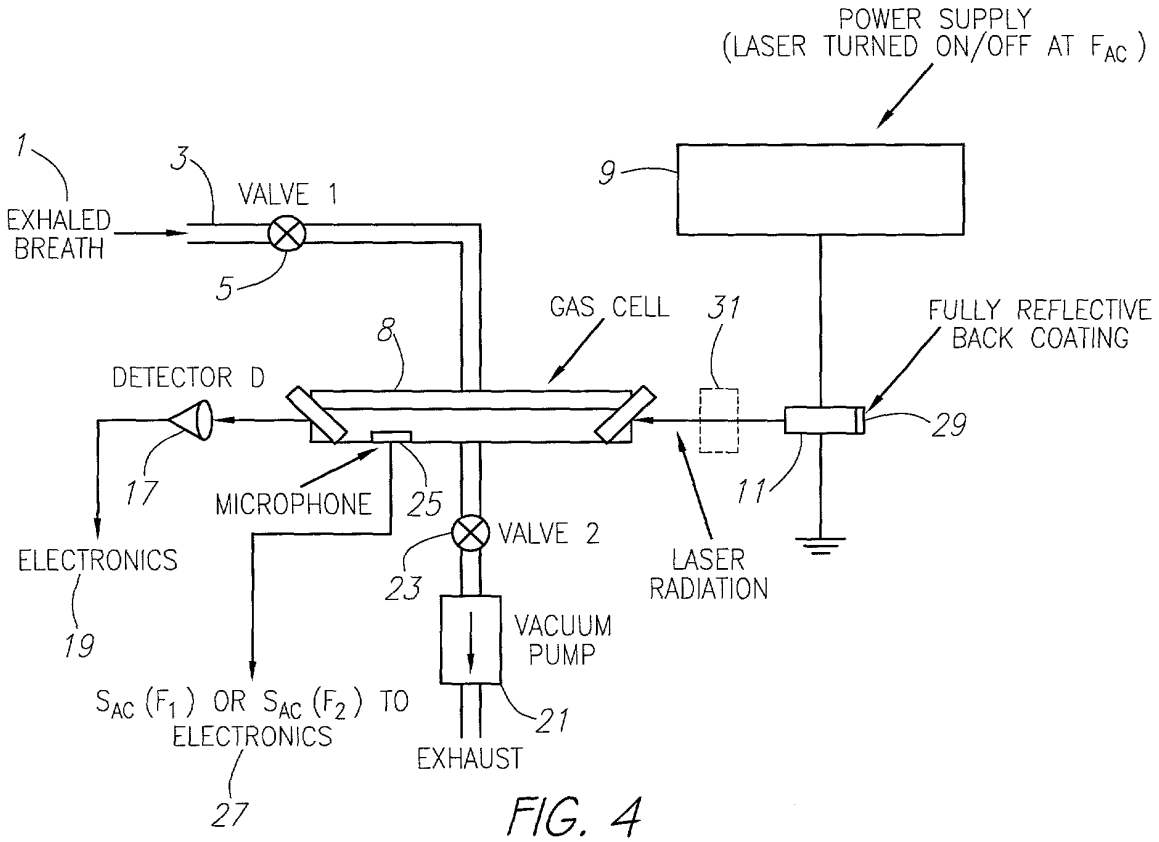
POWER SUPPLY
(LASER TURNED ON/OFF AT F_{AC})
1
EXHALED BREATH
3
VALVE 1
5
9
GAS CELL
31
FULLY REFLECTIVE BACK COATING
8
DETECTOR D
29
17
MICROPHONE
25
11
VALVE 2
23
LASER RADIATION
ELECTRONICS
19
VACUUM PUMP
21
$S_{AC}(F_1)$ OR $S_{AC}(F_2)$ TO ELECTRONICS
27
EXHAUST

FIG. 4

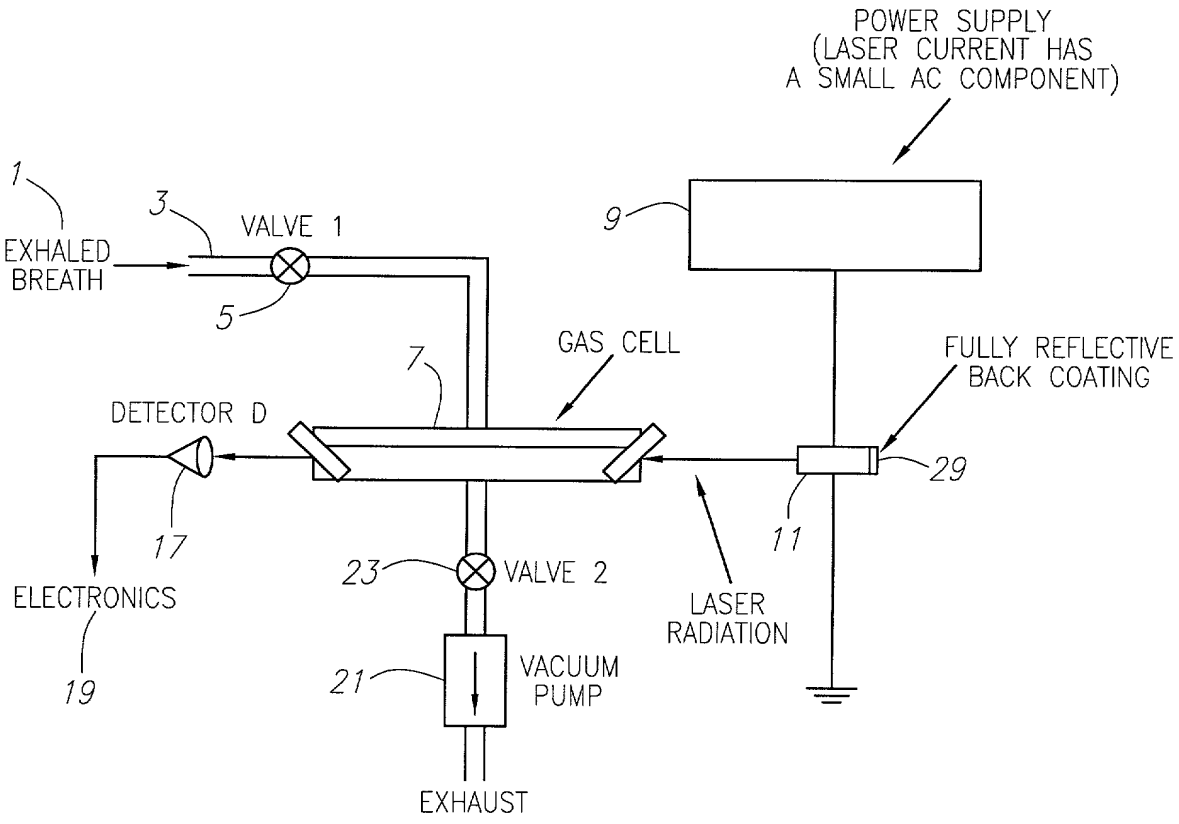
POWER SUPPLY
(LASER CURRENT HAS
A SMALL AC COMPONENT)
1
EXHALED
BREATH
3
VALVE 1
5
9
GAS CELL
7
FULLY REFLECTIVE
BACK COATING
DETECTOR D
29
17
11
23
VALVE 2
ELECTRONICS
LASER
RADIATION
19
21
VACUUM
PUMP
EXHAUST

FIG. 5

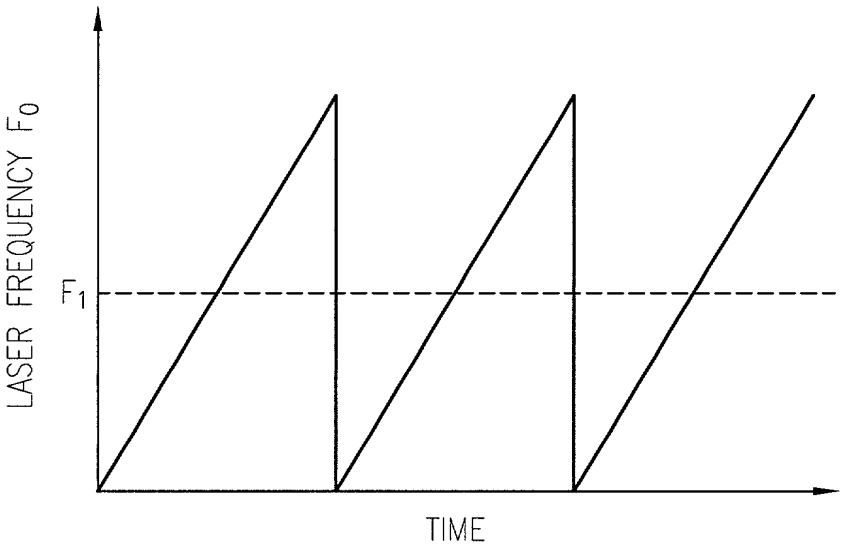

FIG. 6

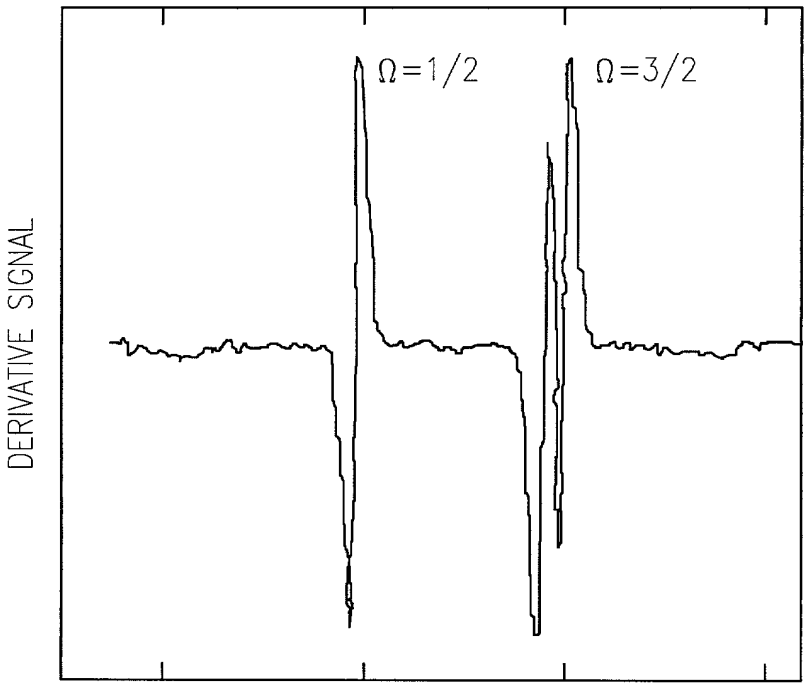

FIG. 7

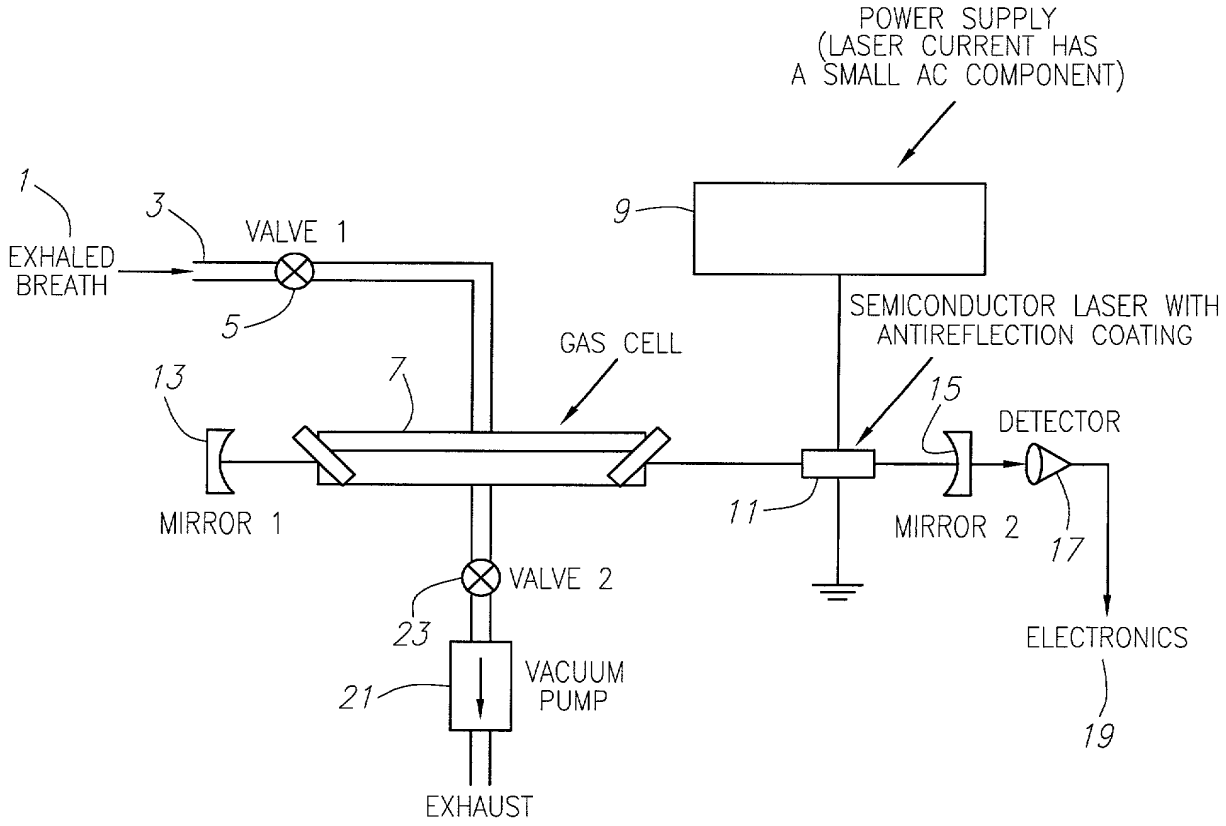
POWER SUPPLY
(LASER CURRENT HAS
A SMALL AC COMPONENT)
1
EXHALED
BREATH
3
VALVE 1
5
9
SEMICONDUCTOR LASER WITH
ANTIREFLECTION COATING
GAS CELL
13
7
15
DETECTOR
MIRROR 1
11
MIRROR 2
17
VALVE 2
23
ELECTRONICS
21
VACUUM
PUMP
19
EXHAUST

FIG. 8

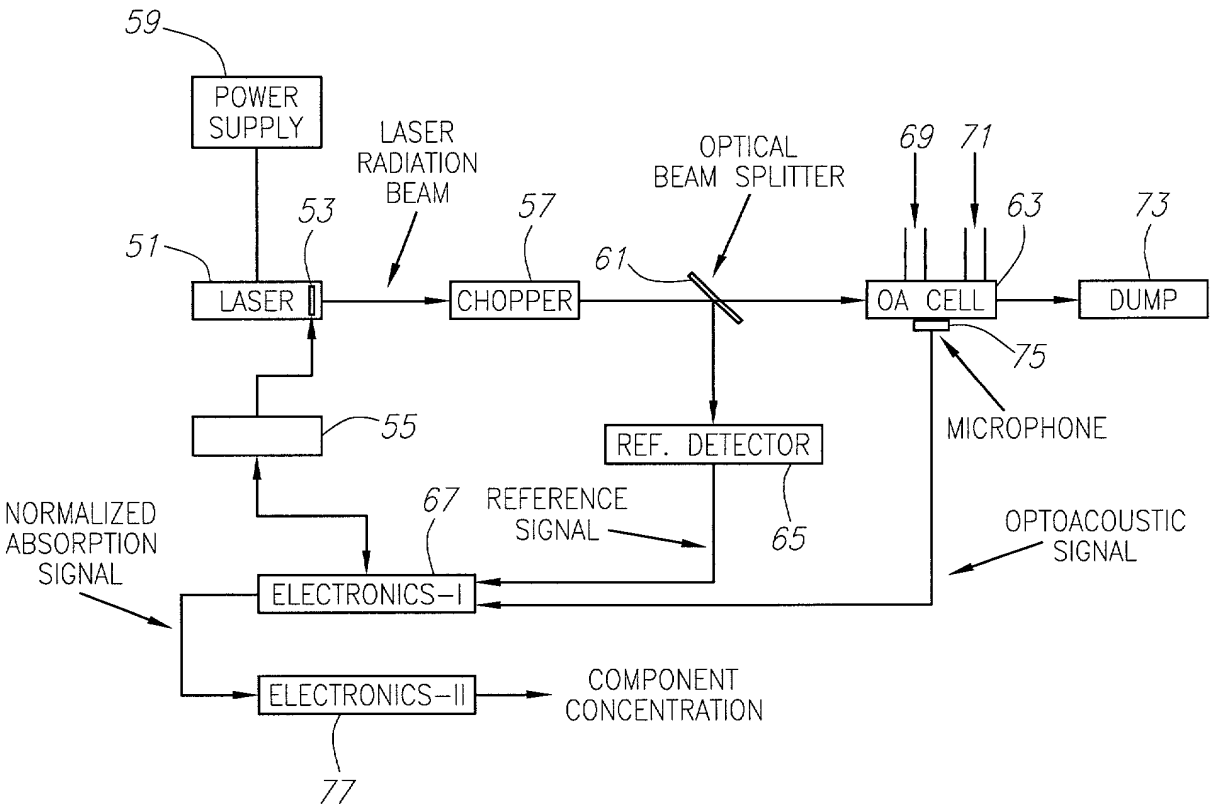
59
POWER SUPPLY
LASER RADIATION BEAM
OPTICAL BEAM SPLITTER
69
71
53
57
63
73
51
61
LASER
CHOPPER
OA CELL
DUMP
75
MICROPHONE
55
REF. DETECTOR
67
REFERENCE SIGNAL
65
NORMALIZED ABSORPTION SIGNAL
OPTOACOUSTIC SIGNAL
ELECTRONICS–I
ELECTRONICS–II
COMPONENT CONCENTRATION
77

FIG. 9

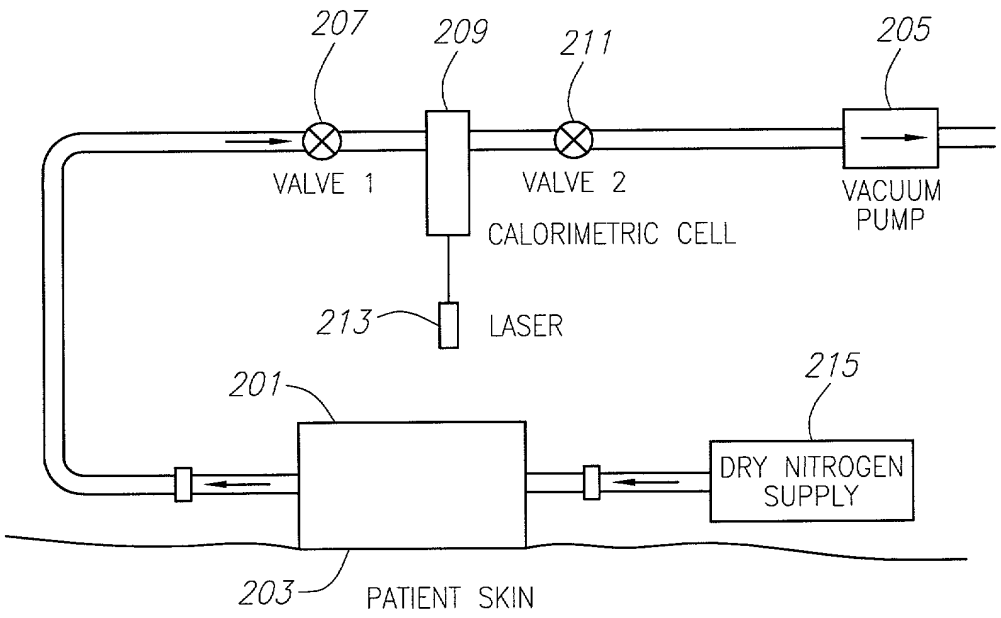
207
209
211
205
VALVE 1
VALVE 2
VACUUM
PUMP
CALORIMETRIC CELL
213
LASER
201
215
DRY NITROGEN
SUPPLY
203
PATIENT SKIN

FIG. 10

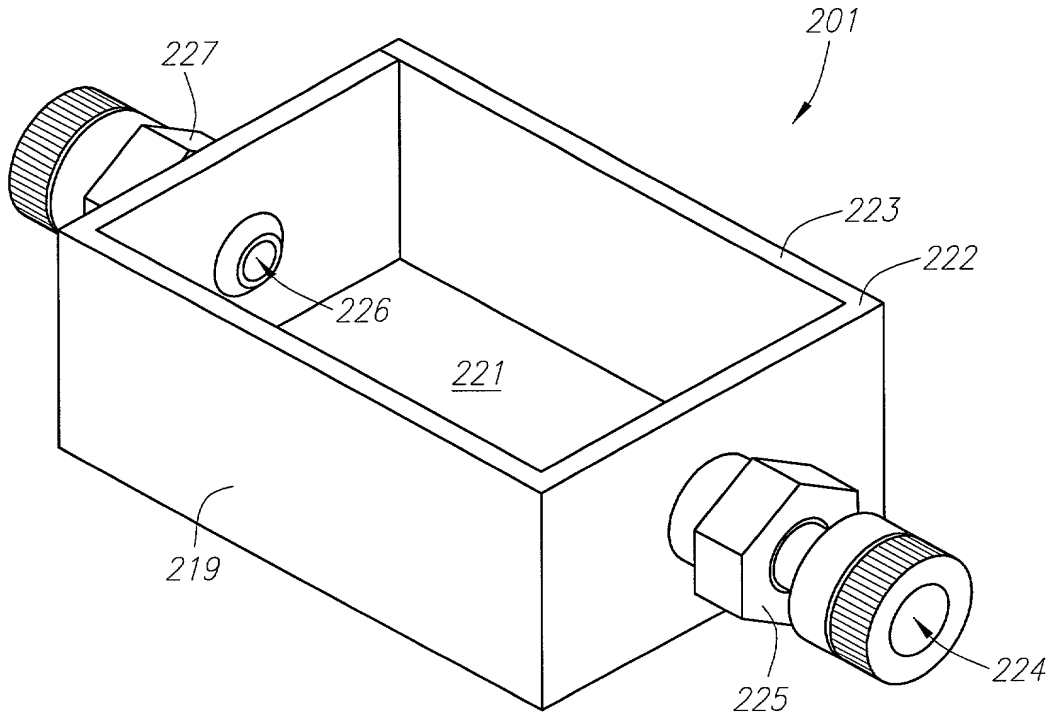
201
227
223
222
226
221
219
225
224

FIG. 11

LASER AT FREQUENCY f_1			
	OPTOACOUSTIC SIGNAL (milliVolts)	LASER POWER P (Watts)	NORMALIZED SIGNAL (milliVolts/Watts)
INTIAL ROOM AIR SIGNAL	0.732 to 0.735	2.13	0.35
2 MINUTE SKIN SIGNAL	0.777 to 0.801	2.13	0.37
ROOM AIR SIGNAL AFTER 5 MINUTES	0.745 to 0.760	2.13	0.353
NET SKIN SIGNAL			0.017 TO 0.02

FIG. 12A

LASER AT FREQUENCY f_2			
	OPTOACOUSTIC SIGNAL (milliVolts)	LASER POWER P (Watts)	NORMALIZED SIGNAL (milliVolts/Watts)
INTIAL ROOM AIR SIGNAL	0.626 to 0.65	2.25	0.284
2 MINUTE SKIN SIGNAL	0.645 to 0.666	2.25	0.29
ROOM AIR SIGNAL AFTER 5 MINUTES	0.638 to 0.666	2.25	0.29
NET SKIN SIGNAL			0.001 TO 0.006

FIG. 12B

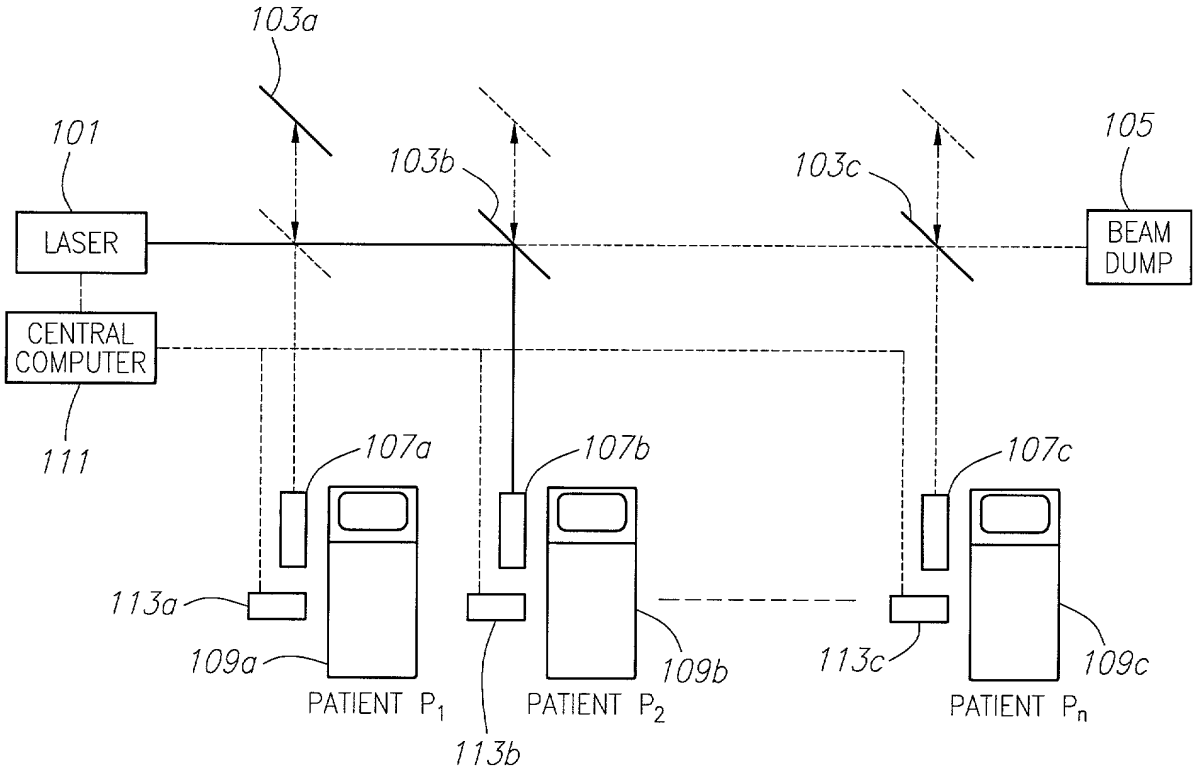
103a
101
103b
103c
105
LASER
BEAM DUMP
CENTRAL COMPUTER
111
107a
107b
107c
113a
109a
PATIENT P_1
113b
PATIENT P_2
109b
113c
109c
PATIENT P_n

FIG. 13

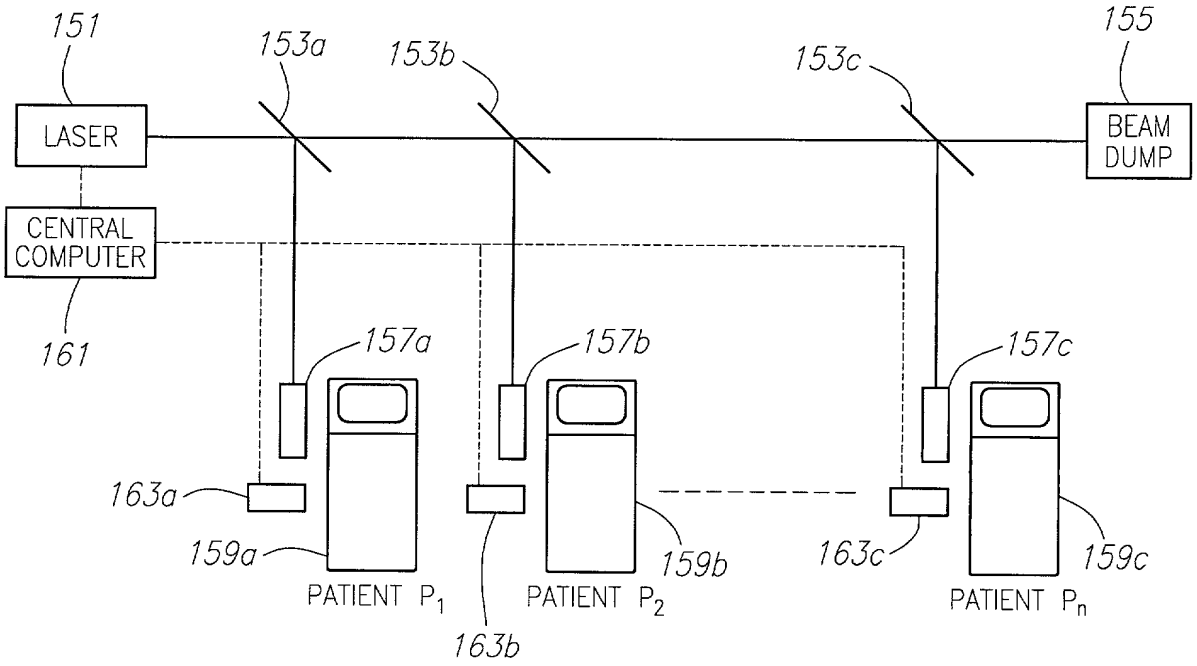
151
153a
153b
153c
155
LASER
BEAM DUMP
CENTRAL COMPUTER
161
157a
157b
157c
163a
159a
PATIENT P_1
163b
PATIENT P_2
159b
163c
159c
PATIENT P_n

FIG. 14